MATHEMATICAL MODELLING OF COVID19 CASES

DR. HEMLATA PANDE

ASSISTANT PROFESSOR

DEPARTMENT OF MATHEMATICS

GOVT. P. G. COLLEGE BAGESHWAR, UTTARAKHAND, INDIA

hlpande@rediffmail.com

ABSTRACT

PRESENT PAPER IS AN ATTEMPT TO REPRESENT THE NUMBER OF COVID CASES IN THE FORM OF MATHEMATICAL EQUATION.

INTRODUCTION

IN THE DIRECTION FOR THE APPLICATION OF MATHEMATICAL MODELLING FOR THE COVID CASES THE WORKS [1], [2] AND [3] ETC CAN BE CITED TO MENTION ONLY A FEW. IN THE PRESENT PAPER AN ATTEMPT HAS BEEN MADE IN THE DIRECTION TO REPRESENT THE CUMULATIVE NUMBER OF INFECTED CASES IN THE FORM OF A MATHEMATICAL RELATION WITH TIME AND TO CHECK WHETHER IN THE CASE OF NUMBER OF RECOVERED CASES WEATHER THE SAME KIND OF EQUATION IS APLLIED.

METHOD

DATA OF CUMULATIVE NUMBER OF INFECTED CASES AT DIFFERENT DATES FOR WORLDWIDE, USA, ITALY, UK AND GERMANY HAVE BEEN OBTAINED FROM THE 'Statista' < https://www.statista.com/> WEBSITE; AND THE DATA FOR THE COVID CASES IN INDIA < https://www.covid19india.org/> HAVE BEEN USED.

I HAVE TRIED TO FIND A RELATIONSHIP BETWEEN TIME T AND THE TOTAL NUMBER OF INFECTED PEOPLE AFTER TIME T. WHERE IT HAS BEEN ASSUMED THAT 1 UNIT OF T IS EQUAL TO 3 DAYS. THE RELATIONSHIP BETWEEN T AND THE NUMBER OF INFECTED CASES AFTER TIME T WAS FITTED IN THE FORM OF 2- PARAMETRIC MODEL WITH THE HELP OF DataFit SOFTWARE . FITTING OF MODELS HAVE BEEN CHECKED WITH THE HELP OF COEFFICIENT OF MULTIPLE DETERMINATION.

RESULTS

THE BEST 2-PARAMETRIC MODEL IN THE CASE OF ALL CONSIDERED COUNTRIES IS

F=A*EXP(B/T) (1); WHERE F DENOTES TOTAL NUMBER OF INFECTED CASES AFTER TIME T.

PREDICTIONS

IN THE CASE OF INDIA THE DETERMINED VALUES OF A AND B ARE AS:

A=23162150.3733

B=-198.7161

WITH COEFFICIENT OF MULTIPLE DETERMINATION= 0.998

WITH THE HELP OF THE EQUATION (1) THE NUMBER OF INFECTED CASES PREDICTED ON DATES 20 APR AND 23 APR WILL BE

20 APR. =19169

23 APR. =24483

AND THE NUMBER OF INFECTED CASES WILL BE CONTINOUSLY INCRESE UNTILL THE CHAIN OF INFECTIONS WILL BE CRASHED. SO IT IS NECESSARY THAT THE CHAIN OF INFECTION MUST BE BROKE AT THE EARLIEST.

WEATHER THE NUMBER OF RECOVERED CASES MODELED IN THE SAME PATTERN?

IT HAS ALSO BEEN DETERMINED THAT:

IN THE CASE OF INDIA IF THE TIME T STARTED FROM THE DAY WHEN THETRE WAS FIRST RECOVERED CASE AND IF T IS NOTED IN THE SAME WAY AS DISCUSSED EARLIER THEN THE NUMBER OF RECOVERED CASES AFTER TIME T WILL FOLLOW SIMILAR RULE WITH DIFFERENT VALUES OF PARAMETERS A AND B.

REFERENCES

[1]Benjamin Ivorra , Miriam Ruiz Ferrández, María Vela, A.M. Ramos (2020). Mathematical modeling of the spread of the coronavirus disease 2019 (COVID-19) taking into account the undetected infections. The case of China. < file:///C:/Users/hemlata%20pandey/Downloads/2020-04-01-02-art-Coronavirus-China-RG.pdf>.

[2] Kucharski AJ, Russell TW, Diamond C, Liu Y, Edmunds J, Funk S, Eggo RM . (2020). Early dynamics of transmission and control of COVID-19: a mathematical modelling study. The Lancet. Infectious Diseases.

[3]. Reza Sameni(2020). Mathematical Modeling of Epidemic Diseases; A Case Study of the COVID-19 Coronavirus < https://arxiv.org/pdf/2003.11371.pdf>.

•